

What factors affect the time elite adolescent field hockey players take to return to their sport after an injury?

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ABSTRACT

Introduction. Sports injuries can significantly impact a player's performance, which can, in turn, hinder the overall success of the team during the season. Therefore, it is essential to effectively identify and manage players' injuries. **Aim of Study.** This study focused on assessing the pain levels and return-to-sport periods related to prevalent injuries sustained by elite adolescent field hockey players during their training sessions. Additionally, it aimed to explore the relationship between pain levels and the time taken to return to sport. **Material and Methods.** The study included 62 elite adolescent field hockey players who trained intensively for competitions throughout 2024. We conducted a one-way analysis of variance (ANOVA) to evaluate pain levels and the duration of time required for players to return to sport, depending on the type of injury sustained. Additionally, a linear regression analysis was carried out to explore the relationship between pain levels and the time taken for players to return to their sport after an injury. **Results.** Muscle injuries had the highest incidence, followed by ligament, tendon, bone, and cartilage injuries. There were statistically significant differences in pain levels related to the type of injury ($p < 0.001$). Furthermore, the time it took for athletes to return to their sport varied significantly depending on the injury type ($p < 0.001$). For field hockey players, each 1-point increase in pain led to an average delay of 1.72 additional days before they could return to play ($p < 0.001$). **Conclusions.** In elite adolescent field hockey players, muscle and ligament injuries are associated with significant pain. However, ligament injuries typically require a longer time for athletes to return to sport, while muscle injuries generally allow for a quicker recovery.

KEYWORDS: field hockey, injury, type of injury, return to sports, pain level.

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Introduction

Field hockey is not just an Olympic sport; it is a thrilling competition that captivates both men and women around the world [1]. While field hockey offers various health benefits [2], players face a significant risk of musculoskeletal injuries [3]. Although injury rates in other sports may be higher, epidemiological surveys from the last three Olympics indicated that over 10% of field hockey players experienced injuries [4-6]. When sports injuries occur, players often face limitations in their ability to compete and train, which necessitates rest for accurate diagnosis and treatment [7]. Consequently, sports injuries come with both personal and social costs, impairing performance and ultimately hindering team's success throughout the season [1]. Therefore, implementing injury prevention strategies is crucial for field hockey players.

Injuries typically result in pain, which can lead to retirement in severe cases [7]. Therefore, it is essential to assess athletes' pain levels when they experience injuries. Additionally, understanding the recovery time required to

return to play is important for analyzing sports injuries, as it is unjust to compare a minor injury that allows a quick return with a serious injury that demands an extended recovery period [8, 9]. Considering factors such as injury incidence, sensitivity, and recurrence, the severity of these injuries significantly impacts players' performance [8, 9]. In order to enhance both player safety and performance, the International Olympic Committee (IOC) actively works to prevent sports injuries [10, 11]. Current studies in sports medicine have mainly concentrated on understanding the prevalence of sports injuries and developing effective rehabilitation strategies for those affected [12, 13], often overlooking how these injuries affect pain levels, incidence rates, and recovery periods based on injury type. This suggests a need for greater awareness regarding how the type of injury can influence both pain levels and the duration of recovery, which is often neglected. Understanding the scale of these injury-related issues is a crucial step toward effective prevention [14]. A comprehensive sports injury prevention protocol should evaluate both injury incidence and the factors that contribute to these injuries, both directly and indirectly.

To address these gaps, this study examined pain levels and the duration of recovery associated with common sports injuries encountered by elite adolescent field hockey players during training. Additionally, we sought to explore the relationship between pain levels and recovery times. The results of this study are anticipated to offer significant insights that will assist field hockey players in safely managing their careers and ensuring a successful return to play.

Aim of Study

Injuries in sports can have a profound impact on players' performance, creating a ripple effect that jeopardizes the entire team's chances of success as the season unfolds. It is essential to assess pain levels and the periods of return to sports for these injuries, as they significantly affect factors such as injury incidence, sensitivity, and recurrence. Most studies in the field of sports medicine have focused on the occurrence and rehabilitation of various sports injuries, with less attention paid to how these injuries influence pain levels, injury incidence, and the periods of return to sport, depending on the type of injury. To address this gap, our study decisively examined pain levels and the timelines for returning to sport following common injuries suffered by elite adolescent field hockey players during training. Additionally, it aimed to explore the relationship between pain levels and the periods of return to sport.

Material and Methods

Participants

The study included 62 elite adolescent field hockey players who trained intensively for competitions throughout 2024 (Table 1). The study was conducted in accordance with the Declaration of Helsinki. All players received a clear explanation of the purpose and significance of the study, and their participation was completely voluntary.

Table 1. General characteristics of the subjects

	Men	Women
No	30	32
Age (years)	17.81 (1.23)	17.62 (1.34)
Height (cm)	174.48 (3.99)	165.89 (3.12)
Weight (kg)	68.11 (4.89)	57.47 (3.47)
Body mass index	22.97 (1.86)	21.74 (1.63)
Hours of training	23,456	24,811

Data are presented as mean (\pm SD).

Data collection and analysis

Field hockey players documented the location of their injuries and reported their pain levels with the help of a medical team present on the field at the time of the injury. Subsequently, a sports medical specialist at the team's hospital recorded the injuries using the daily injury report form from the IOC [15]. In cases where a player experienced multiple injuries in different areas of the body from the same incident, each injury was classified separately to ensure comprehensive record-keeping.

Operational definitions

We defined a sports injury as any damage to tissue that occurs as a result of participation in sports or as an impairment of normal physical function due to the rapid or repetitive transmission of kinetic energy [15]. Pain levels were measured using the numeric rating scale (NRS), which ranges from 0 to 10, with higher scores indicating more severe pain [16]. The duration of time until a player returned to sports was recorded as the period from the day of the injury to the day they resumed normal training and competitive participation. Players generally trained for about four hours a day, five days a week, across a period of 10 months (or 43.5 weeks). The total training hours were calculated by subtracting the time lost due to injuries from the overall training hours.

Statistical analysis

We examined the characteristics of field hockey players by analyzing technical statistics. We calculated the incidence of various sports injuries using a Poisson distribution and provided a 95% confidence interval (CI) per 1,000 hours of training. Furthermore, we conducted a one-way analysis of variance (ANOVA) to assess pain levels and recovery times associated with different types of injuries. Additionally, we employed simple linear regression analysis to investigate the relationship between pain levels and recovery periods. All statistical analyses were performed using SPSS version 27.0 (IBM, Armonk, NY, USA), with a significance level of $\alpha = 0.05$.

Results

The injury incidence rate for elite adolescent field hockey players was 3.25 injuries per 1,000 training hours (95% CI: 2.76-3.80). Muscle injuries were the most frequent, followed by ligament, tendon, bone, and cartilage injuries (Table 2). Significant differences in pain levels were found based on injury type ($p < 0.001$), with ligament injuries causing the most pain, followed by muscle, bone, tendon, and cartilage injuries (Table 3).

Table 2. Injury rates per 1,000 training hours for elite adolescent Korean field hockey players

Type of injury	Injury rates (95% CI)
Muscle	1.22 (0.93 to 1.58)
Tendon	0.39 (0.24 to 0.61)
Bone	0.33 (0.19 to 0.54)
Cartilage	0.29 (0.16 to 0.49)
Ligament	1.02 (0.75 to 1.34)
Total	3.25 (2.76 to 3.80)

Table 3. Pain level by injury type of elite adolescent Korean field hockey players

Type of injury	Pain level (SD)	<i>F</i>	<i>p</i>
Muscle	4.54 (1.38)	5.609	<0.001
Tendon	4.21 (1.69)		
Bone	4.25 (0.77)		
Cartilage	3.57 (1.28)		
Ligament	5.29 (1.43)		
Total	4.62 (1.46)		

Table 4. Periods of return to sport by injury type in elite adolescent Korean field hockey players

Type of injury	Periods of return to sport (SD)	<i>F</i>	<i>p</i>
Muscle	4.85 (1.86)	54.070	<0.001
Tendon	7.53 (3.17)		
Bone	5.38 (0.62)		
Cartilage	6.64 (1.95)		
Ligament	12.06 (3.62)		
Total	7.64 (4.07)		

Table 5. Simple regression analysis between pain level and return-to-sport periods

	<i>B</i>	β	<i>t</i>	<i>p</i>
Pain level	1.718	0.617	9.773	<0.001

Dependent variable: return-to-sport periods.

Periods of return to sport also varied significantly by injury type ($p < 0.001$), with ligament injuries taking the longest to heal, followed by tendon, cartilage, bone, and muscle injuries (Table 4). A regression analysis showed a significant association between pain levels and return-to-sport time ($p < 0.001$), indicating that each 1-point increase in pain extended the return time by 1.72 days (Table 5).

Discussion

This study aimed to identify the common types of sports injuries experienced by elite adolescent field hockey players, examine their association with pain levels, and determine how pain affects the time taken to return to the sport.

Our findings indicated that muscle injuries were the most prevalent type of injury among field hockey players, followed by ligament, cartilage, and tendon injuries. This aligns with previous research showing that injuries among field hockey players during competitions and training are primarily concentrated in the muscles and ligaments [17, 18]. This trend may stem from the fact that the dynamics of competition and training have not changed significantly over time [19]. Previous studies have highlighted that field hockey players typically experience contact-related and running-related muscle injuries [20], such as bruises and lacerations, along with chronic ligament injuries resulting from overuse [21]. We also found that pain levels associated with different types of injuries were highest for muscle ligament injuries, followed by muscle, tendon, and cartilage

injuries. However, it is important to note that the NRS, which we used to measure pain levels, is a self-administered assessment tool. It relies on the subjective evaluations of participants, meaning that a high pain score does not necessarily indicate a more severe injury [22]. Additionally, Roh et al. [23] highlighted a crucial limitation of self-reported measurement techniques. They noted that these methods predominantly focus on evaluating the sensory dimensions of pain, such as its quality and intensity. Although small variations in the reported values may be statistically significant, they may not have clinical relevance [22].

In our findings, ligament injuries took the longest to allow a return to sport, followed by tendon, cartilage, and muscle injuries. Interestingly, while muscle injuries were associated with the second-highest levels of pain, they had shorter recovery times compared to the other types of injuries. This difference may be explained by the anatomical variations between muscles and other tissues. Ligaments, tendons, and cartilage are tissues characterized by a sparse network of blood vessels [23]. This limited vascularity can hinder the delivery of essential regenerative factors through the bloodstream, impacting the healing process of these structures [23]. As a result, muscles tend to recover more quickly than ligament, tendon, and cartilage injuries due to their better blood supply [24]. However, the reasons for the higher pain levels reported in muscle injuries are not yet fully understood; it may be related to the fear of re-injury. Martinez-Calderon et al. [25] emphasized that pain levels are influenced not only by the physical injury but also by psychological factors and stress. Field hockey players tend to experience a higher rate of re-injury and recurrent injuries [26-28]. Our study found that these players have a greater incidence of muscle injuries compared to other types of injuries. As a result, field hockey players may perceive their pain levels as heightened, possibly due to psychological factors and the stress associated with previous muscle injuries. Frequent injuries lead to significant changes in pain transmission pathways within both the peripheral and central nervous systems [29]. This alteration results in sensitization and hyperalgesia, which increase the intensity of pain signals and heighten sensitivity to pain stimuli [29]. Thus, repeated muscle injuries may lead to a greater recognition of pain levels among field hockey players.

Furthermore, our study indicates that an increase of 1 point in pain levels experienced by field hockey players corresponds to an extended average recovery time of 1.72 days before they can return to their sport. This phenomenon is likely influenced by the high

incidence of ligament injuries observed in our research, which typically result in significant pain and longer recovery periods. However, further studies are essential to enhance our understanding of this relationship.

Our study highlighted several strengths, notably our focus on elite adolescent field hockey players representing South Korea, capturing their athletic potential. Over a year-long monitoring period, we documented every injury during training, tracking pain levels and the periods of return to sports. Our analysis of return-to-sport periods by injury type and pain severity revealed important insights in sports medicine. However, our study had limitations: we did not explore injury mechanisms or training load nuances, and some injuries may have gone unreported despite our rigorous data collection. Additionally, we chose not to classify players by sex and position to preserve sample size, and our findings, which focused exclusively on Korean players, may not be generalizable to other populations, which is an important consideration for future studies.

Conclusions

Elite adolescent field hockey players are particularly susceptible to injuries that affect their muscles and ligaments during training. These injuries often come with significant pain levels, impacting periods of return to sports. While ligament injuries typically necessitate a longer period away from the sport, muscle injuries generally allow for a quicker return. Additionally, higher pain levels are correlated with prolonged periods of return to sports. Understanding these dynamics can help in developing data-driven safety measures and effective return-to-sport protocols for injured field hockey players.

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Conflict of Interest

The authors declare no conflict of interest.

References

1. Barboza SD, Joseph C, Nauta J, van Mechelen W, Verhagen E. Injuries in field hockey players: a systematic review. *Sports Med.* 2018;48(4):849-866. <https://doi.org/10.1007/s40279-017-0839-3>
2. Reiner M, Niermann C, Jekauc D, Woll A. Long-term health benefits of physical activity – a systematic review of longitudinal studies. *BMC Public Health.* 2013;13(1):813. <https://doi.org/10.1186/1471-2458-13-813>

3. Murtaugh K. Field hockey injuries. *Curr Sports Med Rep.* 2009;8(5):267-272. <https://doi.org/10.1249/JSR.0b013e3181b7f1f4>
4. Engebretsen L, Soligard T, Steffen K, Alonso JM, Aubry M, Budgett R, et al. Sports injuries and illnesses during the London Summer Olympic Games 2012. *Br J Sports Med.* 2013;47(7):407-414. <https://doi.org/10.1136/bjsports-2013-092380>
5. Soligard T, Palmer D, Steffen K, Lopes AD, Grek N, Onishi K, et al. New sports, COVID-19 and the heat: sports injuries and illnesses in the Tokyo 2020 Summer Olympics. *Br J Sports Med.* 2022;57(1):46-54. <https://doi.org/10.1136/bjsports-2022-106155>
6. Soligard T, Steffen K, Palmer D, Alonso JM, Bahr R, Lopes AD, et al. Sports injury and illness incidence in the Rio de Janeiro 2016 Olympic Summer Games: a prospective study of 11274 athletes from 207 countries. *Br J Sports Med.* 2017;51(17):1265-1271. <https://doi.org/10.1136/bjsports-2017-097956>
7. Jung GT, Park KJ. Lower back pain scale and return to sports in elite Taekwondo athletes with lower back injuries. *Phys Med Rehab Kuror.* 2024;34(04):214-221. <https://doi.org/10.1055/a-2089-1609>
8. Park KJ. What are the risk factors of injury for a rowing athlete? *J Sports Med Phys Fit.* 2024;64(9):925-930. <https://doi.org/10.23736/S0022-4707.24.15776-3>
9. Park KJ. Are isokinetic muscle function related to lower extremity sports injuries in elite taekwondo athletes? *J Sports Med Phys Fit.* 2025;65(10):1356-1362. <https://doi.org/10.23736/S0022-4707.25.16875-8>
10. Kim JC, Park KJ. Epidemiology of injuries in elite Korean adolescent football (soccer) athletes: a prospective cohort study. *Phys Med Rehab Kuror.* 2024;34(01):36-43. <https://doi.org/10.1055/a-1933-3328>
11. Park KJ, Jeong DN. Injuries pattern and heart rate variation in elite judo athletes: a Korean prospective cohort study. *Sci Sports.* 37(5-6):496.e1-496.e7. <https://doi.org/10.1016/j.scispo.2022.03.001>
12. Kim CW, Park KJ. Effect of the perception of knee pain on muscle strength and endurance among elite female handball players. *Phys Med Rehab Kuror.* 2021;31(04):262-267. <https://doi.org/10.1055/a-1416-3937>
13. Park KJ. Comparison of subjective and objective evaluation of back injuries of elite taekwondo athletes. *Sci Sports.* 2024;39(4):341-347. <https://doi.org/10.1016/j.scispo.2023.12.001>
14. Ross AG, Donaldson A, Poulos RG. Nationwide sports injury prevention strategies: a scoping review. *Scand J Med Sci Sports.* 2021;31(2):246-254. <https://doi.org/10.1111/sms.13858>
15. Bahr R, Clarsen B, Derman W, Dvorak J, Emery CA, Finch CF, et al. International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). *Br J Sports Med.* 2020;54(7):372-389. <https://doi.org/10.1136/bjsports-2019-101969>
16. Lee JY, Park KJ. Lower extremity injury and return to sports of elite taekwondo athletes. *Phys Med Rehab Kuror.* 2025;35(05):280-287. Epub 2024 Sep 09. <https://doi.org/10.1055/a-2392-2978>
17. Rees H, Shrier I, Persson UM, Delahunt E. Transient injuries are a problem in field hockey: a prospective one-season cohort study. *Transl Sports Med.* 2020;3(2):119-126. <https://doi.org/10.1002/TSM2.126>
18. Theilen TM, Mueller-Eising W, Bettink PW, Rolle U. Video analysis of acute injuries in elite field hockey. *Clin J Sport Med.* 2021;31(5):448-452. <https://doi.org/10.1097/JSM.0000000000000785>
19. Park KJ, Song BB. Injuries in female and male elite taekwondo athletes: a 10-year prospective, epidemiological study of 1466 injuries sustained during 250 000 training hours. *Br J Sports Med.* 2018;52(11):735-740. <https://doi.org/10.1136/bjsports-2017-097530>
20. Barboza SD, Nauta J, van der Pols MJ, van Mechelen W, Verhagen EALM. Injuries in Dutch elite field hockey players: a prospective cohort study. *Scand J Med Sci Sports.* 2018;28(6):1708-1714. <https://doi.org/10.1111/sms.13065>
21. Leelavathy MJ, Madhu GR. A review study on common injuries in field hockey players. *Int J Physiol Nutr Phys Educ.* 2021;6(2):17-19. <https://doi.org/10.22271/journalofsport.2021.v6.i2a.2263>
22. Kim HC, Park KJ. Type of injury and recovery time in elite adolescent Korean judo athletes: an epidemiological study. *Int J Sports Sci Coach.* 2021;16(3):682-689. <https://doi.org/10.1177/1747954121990951>
23. Roh HL, Kim CW, Park KJ. Epidemiology of injuries in elite Korean handball athletes: a prospective cohort study. *J Phys Fit Sports Med.* 2022;62(1):90-97. <https://doi.org/10.23736/S0022-4707.21.12121-8>
24. Kim CW, Park KJ. Injuries and time loss in elite judo athletes: a Korean prospective cohort study. *J Phys Fit Sports Med.* 2021;61(10):1380-1386. <https://doi.org/10.23736/S0022-4707.20.11760-2>
25. Martinez-Calderon J, Flores-Cortes M, Morales-Asencio JM, Luque-Suarez A. Which psychological factors are involved in the onset and/or persistence of musculoskeletal pain? An umbrella review of systematic

- reviews and meta-analyses of prospective cohort studies. *Clin J Pain*. 2020;36(8):626-637. <https://doi.org/10.1097/AJP.0000000000000838>
26. Rees H, McCarthy Persson U, Delahunt E, Boreham C, Blake C. Epidemiology of injuries in senior men's field hockey: a two-season prospective observational injury surveillance study. *J Sports Sci*. 2020;38(24):2842-2849. <https://doi.org/10.1080/02640414.2020.1802094>
27. Rees H, McCarthy Persson U, Delahunt E, Boreham C, Blake C. Winter breaks: how do they affect injuries in field hockey? *J Sci Med Sport*. 2022;25(11):911-917. <https://doi.org/10.1016/j.jsams.2022.08.004>
28. Rees H, Persson UM, Delahunt E, Boreham C, Blake C. The incidence of injury in male field hockey players: a systematic review and meta-analysis. *Phys Ther Sport*. 2021;52(7):45-53. <https://doi.org/10.1016/j.ptsp.2021.08.005>
29. Dehghan B, Abolhasanzadeh N, Shademan B, Nourazarian A. Deciphering pain: molecular mechanisms and neurochemical pathways-challenges and future opportunities. *Front Mol Biosci*. 2024;11:1382555. <https://doi.org/10.3389/fmolb.2024.1382555>

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